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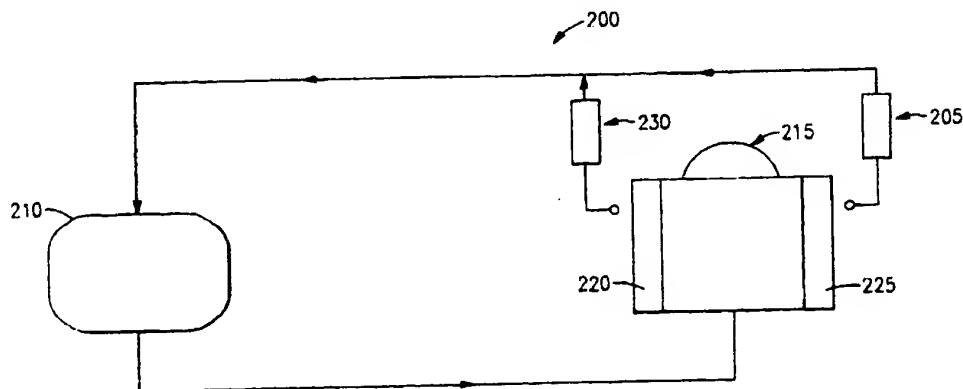
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(54) **Apparatus and method of operating a heat pump to improve heating supply air temperature**

(57) An apparatus and method for a heat pump operating in the heating mode controls the condenser air flow rate and the condenser exiting air temperature depending in a first embodiment on the evaporator ambient temperature, and in a second embodiment, the evaporator air temperature and alternatively the condenser air flow rate or the condenser exiting air temperature, to alleviate a cold blow condition. The apparatus and method operate by sensing the evaporator ambient temperature with a sensor positioned proximate to the

evaporator, and when that temperature is below a threshold value indicating a cold blow situation, determining by circuit means a modified condenser air flow rate to achieve at the same time a slower air flow and a higher air temperature, so that the cold blow condition is terminated or at least alleviated. The apparatus and method alternatively command the blower to achieve a determined condenser air flow, or to achieve a determined blower speed depending upon motor type, that results in a targeted condenser air flow or a targeted condenser exiting air temperature.



**FIG. 2**

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# EUROPEAN SEARCH REPORT

Application Number  
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	US 4 364 237 A (COOPER KENNETH W ET AL) 21 December 1982 (1982-12-21) * column 2, line 64 - column 6, line 64; figures 1,2 *	1-10	F24D19/10
A,D	US 4 978 896 A (SHAH RAJENDRA K) 18 December 1990 (1990-12-18) * column 3, line 32 - column 4, line 51; figure 1 *	11	
A	US 4 271 899 A (NOLAND JOSEPH R) 9 June 1981 (1981-06-09)		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			F24D
Place of search	Date of completion of the search	Examiner	
MUNICH	8 July 2002	Leclaire, T	
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 63 0044

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08-07-2002

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 4364237	A	21-12-1982	CA	1176347 A1	16-10-1984
US 4978896	A	18-12-1990	CA	2015509 A1	26-01-1991
US 4271899	A	09-06-1981	BR	8101913 A	29-09-1981

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